

General Disclaimer

One or more of the Following Statements may affect this Document

- This document has been reproduced from the best copy furnished by the organizational source. It is being released in the interest of making available as much information as possible.
- This document may contain data, which exceeds the sheet parameters. It was furnished in this condition by the organizational source and is the best copy available.
- This document may contain tone-on-tone or color graphs, charts and/or pictures, which have been reproduced in black and white.
- This document is paginated as submitted by the original source.
- Portions of this document are not fully legible due to the historical nature of some of the material. However, it is the best reproduction available from the original submission.

Development and Testing of the VAHIRR Radar Product

Joe Barrett III, Juli Miller, Debbie Charnasky and Robert Gillen ENSCO, Inc., Cocoa Beach, FL
Richard Lafosse, Brian Hoeth, Doris Hood NWS Spaceflight Meteorology Group, Houston, TX
Todd McNamara 45th Weather Squadron, Patrick AFB, FL

Lightning Launch Commit Criteria (LLCC) and Flight Rules (FR) are used for launches and landings at government and commercial spaceports. They are designed to avoid natural and triggered lightning strikes to space vehicles, which can endanger the vehicle, payload, and general public. The previous LLCC and FR were shown to be overly restrictive, potentially leading to costly launch delays and scrubs. A radar algorithm called Volume Averaged Height Integrated Radar Reflectivity (VAHIRR), along with new LLCC and FR for anvil clouds, were developed using data collected by the Airborne Field Mill II research program.

VAHIRR is calculated at every horizontal position in the coverage area of the radar and can be displayed similar to a two-dimensional derived reflectivity product, such as composite reflectivity or echo tops. It is the arithmetic product of two quantities not currently generated by the Weather Surveillance Radar 1988 Doppler (WSR-88D): a volume average of the reflectivity measured in dBZ and the average cloud thickness based on the average echo top height and base height.

This presentation will describe the VAHIRR algorithm, and then explain how the VAHIRR radar product was implemented and tested on a clone of the National Weather Service's (NWS) Open Radar Product Generator (ORPG-clone). The VAHIRR radar product was then incorporated into the Advanced Weather Interactive Processing System (AWIPS), to make it more convenient for weather forecasters to utilize. Finally, the reliability of the VAHIRR radar product was tested with real-time level II radar data from the WSR-88D NWS Melbourne radar.

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
<p>The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.</p> <p>PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.</p>					
1. REPORT DATE (DD-MM-YYYY) 19-07-2007		2. REPORT TYPE Abstract		3. DATES COVERED (From - To) Jun 2005 - Jul 2007	
4. TITLE AND SUBTITLE Development and Testing of the VAHIRR Radar Product				5a. CONTRACT NUMBER NNK06MA70C	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Joe H. Barrett III Juli Miller, Debbie Charnasky, Robert Gillen Richard Lafosse, Brian Hoeth, Doris Hood Todd McNamara				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) ENSCO, Inc. 1980 N. Atlantic Ave. Suite 230 Cocoa Beach, FL 32931				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) NASA John F. Kennedy Space Center Code KT-C-H Kennedy Space Center, FL 32899				10. SPONSORING/MONITOR'S ACRONYM(S)	
				11. SPONSORING/MONITORING REPORT NUMBER	
12. DISTRIBUTION/AVAILABILITY STATEMENT Unclassified, Unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT Lightning Launch Commit Criteria (LLCC) and Flight Rules (FR) are used for launches and landings at government and commercial spaceports. They are designed to avoid natural and triggered lightning strikes to space vehicles, which can endanger the vehicle, payload, and general public. The previous LLCC and FR were shown to be overly restrictive, potentially leading to costly launch delays and scrubs. A radar algorithm called Volume Averaged Height Integrated Radar Reflectivity (VAHIRR), along with new LLCC and FR for anvil clouds, were developed using data collected by the Airborne Field Mill II research program. This presentation will describe the VAHIRR algorithm, and then explain how the VAHIRR radar product was implemented and tested on a clone of the National Weather Service's (NWS) Open Radar Product Generator (ORPG-clone). The VAHIRR radar product was then incorporated into the Advanced Weather Interactive Processing System (AWIPS), to make it more convenient for weather forecasters to utilize. Finally, the reliability of the VAHIRR radar product was tested with real-time level II radar data from the WSR-88D NWS Melbourne radar.					
15. SUBJECT TERMS lightning, launch commit criteria, flight rules, radar, field mill					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Dr. Francis J. Merceret
	U	U	UU	1	19b. TELEPHONE NUMBER (Include area code) (321) 867-0818